WIND ON THE WIRES: **Responses to Questions posted to Michigan Energy Forum Website**

11. What are the current and projected relative costs per kilowatt hour for existing and new builds for wind, solar, hydro, biomass, landfill gas, coal, natural gas, nuclear, and other sources? How would those differ if placed in another jurisdiction electrically tied to Michigan?

Below is a table comparing the levelized cost of energy of different generation sources with and without tax incentives. The data below is out-of-date, so the table below should only be used for demonstrative purposes. It demonstrates that the cost of onshore wind energy is in the same range of costs of other fossil-fuels.

In this table the cost of power is the average total lifetime cost of the electricity divided by the total electricity generated.

Stephen Lacey, "*Where Renewables Stack Up: Comparative Chart on Levelized Cost of Energy and the "Value" pf Clean Energy*" (6/24/2011), available at

http://thinkprogress.org/climate/2011/06/24/253357/where-renewables-stack-up-comparitive-chart-on-levelized-cost-of-energy-and-the-value-of-clean-energy/

Since the chart above is based on 2009 data, we suggest that the PSC and MOE consider more recent studies with levelized cost of energy, such as: *Sustainable Energy in America 2013 Factbook*,by Bloomberg, and *Levelized Cost of Energy Analysis – version 6.0*, by Lazard. The U.S. Energy Information Administration also presents levelized costs of energy for 2018, however, their costs seem to be high with respect to onshore wind and low with respect to natural gas.

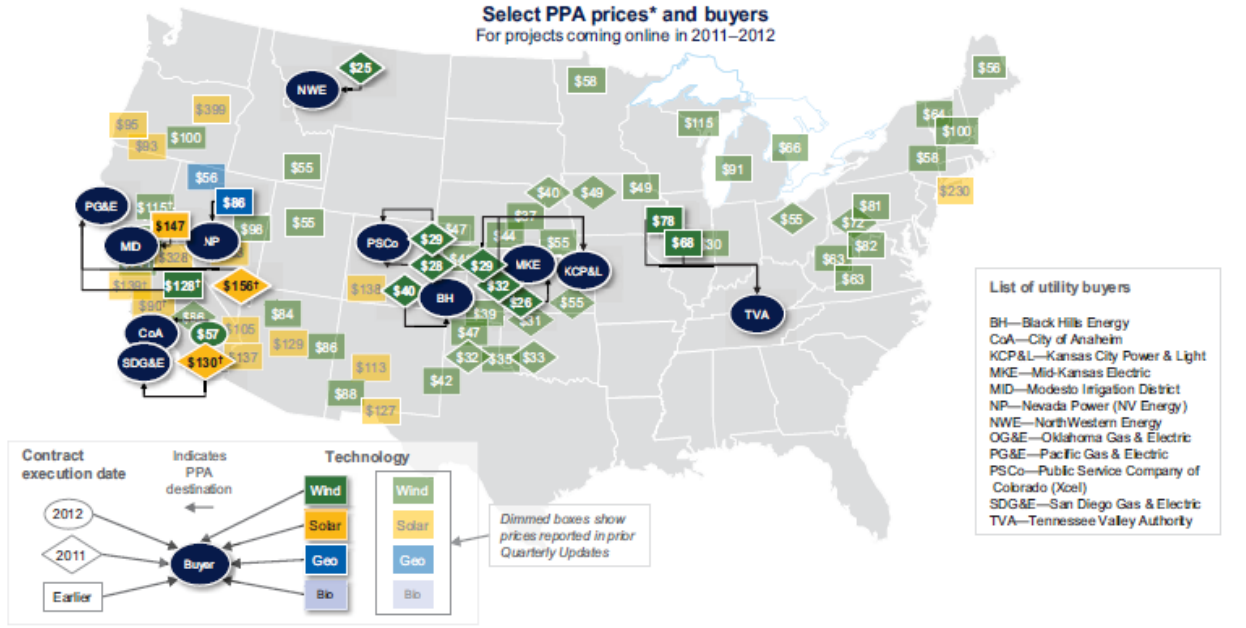
Costs per kilowatt for wind energy have been decreasing in recent years in large part to increasingly efficient technology, and more competitive turbine manufacturing and marketing in the United States and Lawrence Berkley National Lab reported that "on average, and in real dollar terms, wind power will cost…no more (and even slightly less) in 2031 than it does today" (LBNL, *Revisiting the Long-Term Value of Wind as Hedge*, at 8 (draft March 7, 2013)).

Sources: Bloomberg Finance LP and the Business Council for Sustainable Energy, *Sustainable Energy in America 2013 Factbook*, at 14 (January 2013) , *available at* http://www.bcse.org/sustainableenergyfactbook.html; Lazard, *Levelized Cost of Energy Analysis – version 6.0*, (June 2012), *available at* https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20121221/20121221%20PAC%20Supplemental%20Levelized%20Cost%20of%20Energy%20Analysis.pdf; and United States Energy Information Administration (Annual Energy Outlook 2013).

To compare Michigan costs to other locations, attached is a diagram depicting select power purchase agreement prices and their approximate location in the United States:

Q4 2012 North America Renewable Power Market Update

Renewable power pricing



Note: *All prices in US$/MWh. †May not reflect full average annual price received after time of delivery factors. Locations are approximate; prices are averages for available transactions through Q3 2012, not including test energy. See additional notes in the accompanying data sheets
Source: FERC, IHS

New data shows multiple wind projects selling power below US$30/MWh in Colorado, Kansas, and Montana

Sean Brady, Wind on the Wires